

device being prepared by a method comprising the steps of:

forming an insulating layer on a first portion of a surface of a substrate, so as to define a step-like structure;

disposing a first electrode on a second portion of the surface of the substrate;

disposing a second electrode on an upper surface of the insulating layer; and
providing a layer along a side of the insulating layer, between the first and second electrodes, the layer being an insulating layer which includes a conductive material.

57. (Not Changed From Prior Version) A method of fabricating an image forming apparatus which includes an electron source and a phosphor plate, the electron source including a plurality of electron-emitting devices that are each prepared by a method according to any one of Claims 51-56.

REMARKS

Claims 1-6, 8, 9, 11, 12, 15, 16, 18-43, 45, and 49-57 remain pending in this reissue application. Claims 6, 8, 9, 11, 12, 16, 18, 19-22, 29, 36, 37, 38, 42, 43, 45, and 51-54 have been amended herein.² Claims 7, 10, 13, 14, 17, 44, and 46-48 have been

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Claims 6, 9, and 43 have been amended to recite that the metal is Pd (and Claim 17 now depends from Claim 13), Claim 8 has been amended to depend from Claim 6 only, Claim 11 has been amended to incorporate features similar to those recited in the previous version of Claim 9, Claims 12, 38, and 54 have been amended to recite that the conductive

canceled without prejudice and without disclaimer of subject matter. Claims 1-3, 6, 9, 11, 12, 16, 23, 28, 33, 36-41, 43, and 49-56 are independent.

Initially, page 6, section 9 of the Office Action states that Claims 46-48 are objected to as being duplicates of Claims 12-14. Without conceding the propriety of that objection, Claim 46-48 have been canceled without prejudice and without disclaimer of subject matter, thereby rendering that objection moot. Accordingly, withdrawal of that objection is respectfully requested.

On page 6, section 8 of the Office Action, Claims 13 and 18 were rejected under 35 U.S.C. § 112, second paragraph, because, according to the Office Action, the recited term “semi-metal” renders those claims indefinite. Without conceding the propriety of that rejection, Claim 13 has been canceled, and Claim 18 has been amended to delete “semi-metal” therefrom. Accordingly, withdrawal of the Section 112 rejection is respectfully requested.

The Office Action sets forth a number of arguments alleging that the reissue declaration originally filed in this application is defective, and also rejects Claims 1-57 under

particles comprise Pd, and Claim 18 has been amended to remove the word “semi-metal” therefrom. Also, Claim 16 has been amended to recite that the layer comprises primarily carbon, Claim 18 has been amended to depend from Claim 16, Claim 19 has been amended to depend from Claim 18, and Claim 45 has been amended to depend from Claim 43 only. Moreover, Claim 51 has been amended to replace “at least some conductive particles” to “at least Pd particles”, and Claims 36, 37, 52, and 53 have been amended to change “metal” to “Pd”. Also, Claims 21 and 22 have been amended to depend from any one of Claims 12, 16, 18, and 19, Claim 29 has been amended to insert “is” between the words “which” and “substantially”, Claim 42 has been amended to insert “a” between “including” and “plurality”, and Claim 20 has been amended to depend from any one of Claims 16, 18, and 19.

35 U.S.C. § 251 on various grounds, as summarized in the following paragraphs (1)-(3).

(1) Pages 2 and 3, sections 1-3 of the Office Action state that the declaration originally filed in this application is defective because it fails to contain a statement that Applicants believe Patent No. 5,759,080 to be wholly or partly inoperative or invalid, and fails to identify at least one error which is relied upon to support the reissue application. According to the Office Action, “[m]erely stating that the inventors did not appreciate that claims 6-17 could have been presented for examination is not sufficient, since it does not assert that applicants claimed less than they had a right to claim . . . [, and] a statement of ‘at least one error being relied upon’, must include the identification of specific subject matter that constitutes an error, e.g. a limitation of the patent claims that results in applicants claiming less than they had a right to claim in the patent.” The Office Action cites 37 C.F.R. § 1.175(a)(1) and MPEP, rev. 1, § 1414 (II) in support of these assertions (see, e.g., pages 2 and 3 of the Office Action).

(2) Page 2, section 2 of the Office Action also asserts that Applicants do not have a right to recapture that which they “gave up to obtain the patent”, since “Applicant canceled certain claims and amended another to avoid a double patenting rejection over claims of U.S. Patent 5,066,083 . . . [,] and [t]hus . . . do not have a right to include claims which are not patentably distinct from the claims of the ‘083 patent”. The Office Action also states that in paper no. 5, filed July 27, 1995, Applicants canceled claims and “elected to direct their claims to the invention of Group III, identified as Claims 134-137 and 141-144, in the divisional now being reissued”, and thus “they do not have a right to claim that subject matter which is not directed to that invention”. Page 3, section 4 of the Office Action states that Claims 1-57 are rejected as allegedly being based upon a defective reissue declaration under 35 § U.S.C. 251, apparently for the reasons noted above.

(3) Pages 4 and 5, sections 5-6 of the Office Action state that Claims 12-15, 38, 46-48, and 54 and Claims 6-10, 36, and 37, respectively, are rejected under 35 U.S.C. § 251 as being an improper recapture of “broadened claimed subject matter surrendered in the application for the patent upon which the present reissue is based”, and “the narrow scope of the claims in the patent was not an error within the meaning of 35 U.S.C. 251”. According to the Office Action, reissue Claims 12, 38, and 54 present an improper recapture of subject matter obvious from a previous Claim 137, which “Applicants canceled . . . in favor of more restrictive claims” With respect to Claims 6-10, 36, and 37, the Office Action alleges that those claims present an improper recapture of subject matter obvious from previous Claims 134-136, which, according to the Office Action, was canceled “[t]o avoid the filing of a terminal disclaimer”.

The arguments set forth in the Office Action and summarized in the above paragraphs (1)-(3) will now be addressed.

Initially, cancellation of Claims 7, 10, 13, 14, 17, 44, and 46-48 renders all issues relating to those claims moot.

Also, Applicants respectfully disagree with the Office Action’s assertion that the originally filed reissue declaration is defective. Applicants have carefully considered 37

C.F.R. § 1.175(a)(1) and MPEP § 1414(II) (rev. 1), cited in the Office Action in support of that assertion, and strongly believe that the originally filed reissue declaration complies fully with the requirements of those sections. 37 C.F.R. § 1.175 (a)(1) states:

(A) The reissue oath or declaration . . . must . . . state that:

(1) The applicant believes the original patent to be wholly or partly inoperative or invalid by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than the patentee had the right to claim in the patent, stating at least one error being relied upon as the basis for reissue . . .

MPEP § 1414(II) (rev. 1) states that a reissue applicant must (i)

“acknowledge the *existence* of an error in the specification, drawings, or claims, which error causes the original patent to be defective”, and (ii) “specifically identify an error” (emphasis added).

In the reissue declaration originally filed in the present application, Applicants explicitly declared that they believe U.S. Patent 5,759,080 to be partly inoperative by reason of them claiming less than they had the right to claim. Applicants also specifically identified and clearly acknowledged the existence of an error which they believe causes original U.S. Patent No. 5,759,080 to be partly inoperative; namely, that, during the prosecution of the application (and parents thereof) which matured into that patent, it was not appreciated by the inventors that Claims 6-57 could have been presented for examination.⁶ Accordingly, it is believed that the originally filed reissue declaration

⁶ The originally filed reissue declaration states, in part:

I believe that the original . . . U.S. Patent [5,759,080] is partly inoperative by reason of my having claimed less than I had the right to claim; specifically, new Claims 6-57 should be included in the patent. During the prosecution of U.S. Patent Application No. 08/479,000, which matured into the above-identified U.S. Patent, and during the prosecution of U.S. Patent Applications Nos. 08/396,066, 08/191,065, 07/705,720, and 07/218,203, which are parents of U.S. Patent Application No. 08/479,000, the inventors did not

complies fully with the requirements of 37 C.F.R. § 1.175 (a)(1) and the cited MPEP § 1414. Nonetheless, without conceding that the original reissue declaration is defective, it is intended to file a supplemental reissue declaration in this application shortly, conforming to the requirements set forth in the Office Action.

As pointed out above, on page 4, section 5 of the Office Action, Claims 12-15, 38, 46-48, and 54 were rejected under 35 U.S.C. § 251 as allegedly being an improper recapture of previously surrendered subject matter. In particular, the Office Action asserts that Claims 12, 38, and 54 “correspond . . . to canceled claim 137” of Application No. 08/479,000,⁶ and that, because Claim 137 was “canceled” in that application “in favor of more restrictive claims that recited etching”, Applicants cannot now present Claims 12-15, 38, 46-48, and 54 in the present reissue application. As also pointed out above, on pages 4-5, section 6 of the Office Action, Claims 6-10, 36, and 37 were rejected under 35 U.S.C. § 251 as allegedly being an improper recapture of previously surrendered subject matter. The Office Action supports that rejection by asserting apparently that those claims would be an improper recapture of subject matter recited in Claims 134-136 of Application No. 08/479,000, since, according to the Office Action, those latter claims were canceled during the prosecution of Application No. 08/479,000 “[t]o avoid the filing of a terminal disclaimer . . . and [avoid] claims that would be obvious over the . . . patent claims of 5,066,883”.

appreciate that Claims 6-57 could have been presented for examination It also was noticed that minor errors appeared in the application, and that those errors could and should have been corrected as shown by the underlines and brackets in the present reissue application.

⁶ Application No. 08/479,000 matured into U.S. Patent 5,759,080.

According to MPEP § 1412.02, the following test is used to determine whether the recapture rule applies. First, the Examiner must identify some aspect of the claim which he believes is being broadened in the reissue application (e.g., a reissue claim that deletes a limitation or element from the patent claims is broader in that limitation's aspect). Then, assuming a claim is being broadened, the Examiner must determine whether the broadened aspects of that claim relate to subject matter that the applicant previously surrendered during the prosecution of the original patent.

In a recent opinion, *Pannu vs. Storz Instruments, Inc.*, 2001 U.S. App. LEXIS 16645 (Fed. Cir. 2001), the Court of Appeals for the Federal Circuit restated the test as having three parts. The first part of the test is to determine whether and in what aspect the reissue claims are broader than the patent claims, the second part involves determining whether the broader aspects of the reissue claims relate to surrendered subject matter, and the third part of the test is to determine whether the reissue claims were materially narrowed in other respects to avoid the recapture rule. *Id.* at *9.

In the instant case, even if aspects of the subject matter in independent Claims 12, 38, and 54 are deemed to be broader than the subject matter of Claim 137, the broadened aspects of the reissue Claims 12, 38, and 54 do not relate to the subject matter canceled from Claim 137. For example, in the December 4, 1996 Amendment of Application No. 08/479,000, Applicants canceled from Claim 137 the language "introducing fine particles into an insulating layer, said fine particles being enclosed in the insulating layer so as to partially expose said fine particles." While independent Claim 12, 38, and 54 of the

present reissue application may be deemed broader than Claim 137 (which eventually became Claim 1 of U.S. Patent 5,759,080) in the respect that each claim does not recite an etching step, as was recited in Claim 137, that broader aspect of Claims 12, 38, and 54 is not believed to relate to the above-recited subject matter canceled from Claim 137. Moreover, each of the independent Claims 6, 9, 12, 36-38, and 54, as now amended, is narrowed in a material respect so as to avoid the recapture rule. For example, in contrast to the above-recited subject matter canceled from Claim 137, and in contrast to Claim 1 (formerly Claim 137) of U.S. Patent 5,759,080, Claims 12 and 38 each recite providing a layer comprising an insulating material and at least some conductive particles, wherein at least some conductive particles protrude from a surface of the layer and the conductive particles comprise Pd, and Claim 54 recites providing an insulating layer including at least some conductive particles, wherein at least some of the conductive particles protrude from a surface of the layer and the conductive particles comprise Pd. Also, in contrast to the subject matter from canceled Claims 134-136, Claim 6 of the present reissue application recites providing a layer comprising a metal and a semiconductor, wherein the metal is Pd, Claim 9 recites providing a layer comprising carbon and a metal, wherein the metal is Pd, Claim 36 recites providing a layer comprising Pd and a semiconductor, and Claim 37 recites providing a layer comprising carbon and Pd.

Furthermore, Applicants respectfully submit that they did not, and could not, surrender the claim scope "fabricating an electron source", recited in Claims 36-38 and 54, during the prosecution of Application No. 08/479,000, since no claims having that scope

were presented for examination during the prosecution of that application.

In addition, Applicants respectfully disagree with the Office Action's assertion that Applicants canceled Claims 134-136 of Application No. 08/479,000 "[t]o avoid the filing of a terminal disclaimer . . . and [avoid] claims that would be obvious over the . . . patent claims of 5,066,883". In the Amendment filed on December 4, 1996 in that application, method Claims 134-136 were canceled without prejudice or disclaimer of the subject matter presented therein. Those claims were not canceled to, as the Office Action asserts, "avoid the filing of a terminal disclaimer" Indeed, as can be appreciated in view of page 6 of the December 4, 1996 Amendment, the double-patenting rejection of those claims was improper for the following reasons, as stated on that page:

The claims of the '883 patent are not directed to a method; they are directed to a product. In the parent application 07/218,803, which issued as the '883 patent, there was a restriction requirement. It is understood that the method claims corresponding to the instant claims were canceled. Likewise, in related application 07/705,720, there was a restriction requirement in paper no. 6 dated March 23, 1992 in which the product claims (claims 67-132), generally corresponding to the issued claims of the '883 patent, were restricted out from the instant method claims of Group III claims 134-137 and 141-144. *Therefore, the Patent and Trademark Office has already determined that the instant method claims are patentably distinct from the device claims and can not now reject the instant claims as a double patenting of the issued product claims.* (Emphasis added).

For all of the foregoing reasons, Applicants respectfully submit that the relevant claims discussed above and their corresponding dependent claims of the present reissue application do not present an improper recapture of previously canceled subject

matter, and thus the withdrawal of the rejections under 35 U.S.C. § 251, set forth in the Office Action, is respectfully requested, as is the withdrawal of the Office Action's assertion that the declaration is defective.

On page 7, section 2 of the Office Action, Claims 6, 36, 42, 43, 52, and 57 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 3,611,077 (Smith). On page 7, section 3 of the Office Action, Claims 6, 8, 43, and 45 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 3,663,857 (Soeller et al.). On page 7, section 4 of the Office Action, Claims 9 and 16 were rejected under 35 U.S.C. § 102(a) as anticipated by the article "Bistable Switching in Electroformed Metal-Insulator-Metal Devices", Section 3, *MIM Diodes with Carbonaceous Current Paths (1998)*, by H. Pagnia and N. Sotnik (hereinafter "the Pagnia article"), on page 8, section 6 of the Office Action Claims 6, 8, 36, 42, 43, 45, 52, and 57 were rejected under 35 U.S.C. § 103(a) as obvious from Smith in view of Soellner et al., and, on page 8, section 7 of the Office Action, Claims 9, 16, 18, 20-22, 37, and 53 were rejected under 35 U.S.C. § 103(a) as obvious from either the Pagnia article or the article "The Electroforming Process in MIM Diodes", by Blessing et al. (hereinafter "the Blessing article").

Independent Claims 6, 9, and 43 have been amended to include the features of corresponding canceled dependent Claims 7, 10, and 44, respectively, which, the Office Action states, would have been allowable if based on a proper reissue declaration and if rewritten in independent form. Since, for the reasons given above, the original reissue declaration is believed to be proper, and Claims 6, 9, and 43 now include features

apparently considered patentable by the Examiner, Claims 6, 9, and 43 are deemed to be in condition for allowance.

Independent Claims 36, 37, and 52 are directed to methods for fabricating an electron source, and recite features that are similar in many relevant respects to those of Claims 6, 9, and 43, respectively, and also are believed to be in condition for allowance for the same reasons as are those respective claims.

Independent Claim 53 also is directed to a method for fabricating an electron source, and recites features that are similar in many relevant respects to those of Claim 9, and also is believed to be in condition for allowance for the same reason as is Claim 9.

Independent Claim 16 is directed to a method of fabricating an electron-emitting device, comprising the steps of disposing a pair of electrodes in first and second regions on a substrate, respectively, and providing a layer between the regions. The layer comprises carbon and at least some conductive particles, and comprises primarily carbon.

The Blessing article refers to a process of electroforming and switching requiring an insulating substrate (or a bulk insulator with open pores), two metal electrodes separated by a small distance (between about 10 nm and 100 nm), and adsorbed organic molecules. Blessing also states that it is known that many hydrocarbon molecules are easily cracked at metal surfaces, especially in strong electric fields, and that it is believed the products of a cracking process can link (or cross-link) together in the strong fields, thus building up carbon chains or a graphite-like substance. Apparently, these chains then bridge the gaps between metal islands and the electrodes, and current transport is possible (see

under section 5, entitled “Discussion”, of the Blessing article). The Blessing article also states at page 121, under section 3, that the organic molecules used in investigations contained between one and eight carbon atoms. In the abstract on page 119, the Blessing article refers to switching phenomena in MIM diodes of both planar (with metal island films) and sandwich structures after electroforming in the presence of organic molecules. Apparently, electroforming is enhanced when a more concentrated organic vapour supply is used. According to Blessing, evidently, the current-carrying filaments produced consist predominantly of carbon.

The Pagnia article refers at page 13, fourth paragraph, to metallic bridges between electrodes, for being ruptured by Joule heating and being regrowed from electron material in less than 20 ns. Page 14 of the Pagnia article refers to materials utilized as ground or top electrodes of a sandwich configuration or as thin film materials in planar structures, and shows in Table 1 various electrode and film materials. The table shown on Fig. 19 of the Pagnia article refers to a carbon filament and a carbonaceous filament, and page 20, the sixth full paragraph, states that Pagnia proposes that filaments should consist mainly of carbon. Section 3 (pages 21-33) of the article refers to MIM diodes with carbonaceous current paths, section 3.2 refers to a second electroforming process that is absorption-assisted of A-forming and done in a high or rough vacuum containing hydrocarbons, and page 23 refers to a microslit containing residuals of metal meanders coagulated to islands. Page 28, the third through fifth full paragraphs, refer to amorphous carbon, a carbonaceous material which must not be a homogeneous semiconductor, and

cases related to metallic filaments. Moreover, page 29, the second full paragraph, refers to metal islands with linear dimensions in the case of planar diodes, and the paragraph spanning from the bottom of page 29 to page 30 refers to B-forming that leads to a structure as shown in Fig. 5b, with metal islands randomly distributed in location and size (as thermally coagulated residuals of prior meandered ultrathin metal films). Furthermore, the full paragraph appearing on page 30 states that on account of discreteness of current paths required by electrical features, a conducting material must be inhomogeneously distributed, and page 48, paragraph 2 of the Pagnia article states that after B-forming the role of metals is assumed to act as contact to carbon filaments, and chemical and structural properties of metals strongly influence contact quality.

Applicants respectfully submit that, in their view, even if the Blessing and Pagnia articles be deemed to teach the foregoing respective features, nothing in either of those references is seen to teach or suggest a method of fabricating an electron-emitting device, comprising, *inter alia*, a step of providing a layer between regions where electrodes are disposed, wherein the layer comprises carbon and at least some conductive particles, and comprises primarily carbon, as set forth in Claim 16. Accordingly, Claim 16 is deemed to be clearly patentable over those references.

The other dependent claims in this application that were rejected over the prior art relied on by the Examiner are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the

invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, it is believed that all of the issues expressed in the Office Action have been overcome, and that all of the presently pending claims are in condition for allowance. Accordingly, Applicants respectfully request favorable reconsideration and early passage to issue of the present reissue application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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